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64 Release device for the door of a dishwashing machine.

57 A dishwasher door closure device comprises mechanical means (3, 18) disposed in part on the door (19) and in part on the body (1) of the dishwasher and electrical means (12) for enabling and disabling the said electrically operated members disposed only on the body (1) of the dishwasher itself.

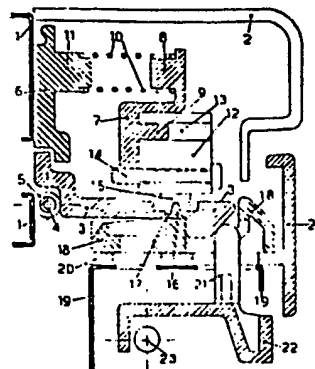


FIG 1

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Release device for the door of a dishwashing machine.

The present invention relates to a closure device for the door of a dishwasher comprising a body, a washing
5 chamber in which there is disposed at least one rotatable drum electrically operated members in particular a heater element and a washing pump, water directing members and a door for closure of the washing chamber.

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It is known that in electrical domestic appliances such as for example washing machines or dishwashers, the doors, as well as allowing the mechanical opening and closing of the apparatus, also actuate a safety
15 switch connected to the mains supply. In this way, if the door is opened during the operation of the apparatus, the electrical energy supply is interrupted and the said apparatus is turned off so as to prevent it from operating with the door open which could en-
20 danger the user. It is also known that in some comm-

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- ercially available dishwashers the electrical part of the appliance is located in the body, whilst the safety switch is positioned on the door. This arrangement makes it necessary for two electrical
- 5 cables to pass from the door to the body of the dishwasher. These cables are subjected, whenever the door is opened or closed, to a torsional and flexural force which after a long time can damage them.
- 10 To avoid this disadvantage it is possible to use particularly flexible cables, but this increases the manufacturing costs of the dishwasher.
- 15 It is also known that in the said dishwashers the safety switch (which is mounted on the door) is operated by a closure striker, fixed on the body acting over a distance of about 60-70 mm. The said closure striker must overcome both the closure force of the safety
- 20 switch plunger (about 350g.) and friction (evaluated at about 200g.). The significant distance between the point of fixture of the closure striker and the safety switch plunger is such that the force which the said closure striker must support at its fixing
- 25 point is in the region of 5-6kg, so that it is necessary to construct such closure striker of very rigid material, which involves significant tolerances in the working and therefore wide variation in the amount of force which must be applied by the user to
- 30 the said closure striker in order to effect opening or closing of the door. In other words this type of door

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closure leads to dishwashers having an opening and closing movement which varies from "relatively soft" to "very hard" without it being possible to determine in advance during design the degree of "softness" of this movement.

Another disadvantage of this type of door closure is due to the fact that the mechanical release of the door takes place first, and then opening of the safety switch after which the electrical supply to the dishwasher is interrupted. Because of this it is possible for the machine to continue to operate for several seconds with the door partially open, which could cause the user (who has just opened the door) to be at risk.

Therefore the object of the present invention is that of overcoming the said disadvantages and providing a door closure device for a dishwasher in which the safety switch is mounted on the body of the dishwasher, the opening and closing movements of the dishwasher will be "soft", and in which if the door is opened with the machine in operation there will first be an interruption of the mains electricity supply and then release of the door. To achieve these objects the subject of the present invention is a door closure device for a dishwasher comprising a body, a washing chamber in which there is disposed at least one rotatable drum, electrically operated members and particularly a heater element and a washing pump, means for directing the

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water within the machine and a door for closure of the washing chamber, characterised by the fact that the said device includes mechanical means disposed in part on the door and in part on the body of the dishwasher, and electrical means for enabling and disabling the said electrically operated members and disposed solely on the body of the dishwasher itself.

Further objects and advantages of the present invention will become clear from the detailed description which follows and from the attached drawings, given purely by way of explanatory and non-limitative example.

In Figure 1 there is shown a transverse section of the door closure device of a dishwasher, forming the subject of the present invention.

In this drawing can be seen: a body 1 of a dishwasher to which a control panel 2 is fixed and to which is pivoted a striker 3 in such a way that it can rotate about the pivot axis formed by two cylindrical pins 4 formed by the striker 3 itself and which are inserted into two cylindrical cavities 5 of a suitable support 6 for the striker, which support in turn is fixed to the body 1 of the dishwasher by means of screws not visible in the drawing.

The striker 3 also has a switch support 7, which is also formed with two cylindrical projections 8 and 9. Over the first projection 8 is fitted one

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end of a biasing spring 10 the other end of which is fitted over a cylindrical projection 11 of the striker support 6 which is positioned in correspondence with the cylindrical projection 8 of the switch support 7.

5 Over the cylindrical projection 9 of the switch support 7 there is fitted a safety switch 12 the electrical terminals of which are connected in series to the mains supply of the machine through its reference hole 13 and which is then fixed to the said

10 switch support 7 by means of a screw 14. The safety switch 12 has a plunger 15 which has a stroke of 1.5 mm between opening and closing its electrical contacts.

The said plunger 15 is controlled by a probe 16

15 through a hole 17 in the striker 3 in register with the plunger 15 itself. That is to say the distance between the safety switch 12 and the striker 3 is such that there is no interference between the plunger 15 and the striker 3; moreover the dimensions of the

20 hole 17 are such that a test device of dimensions standardised by the authorities which provide the regulations in relation to utiliser safety, cannot succeed in actuating the plunger 15 when the safety switch 12 is mounted on the switch support 7. The

25 probe 16 forms part of a latch block 18 which is fixed by means of screws (not visible in the drawing) to the door 19 of the dishwasher. Between the latch block 18 and the door 19 there is inserted a fixed

30 handle 20 which has holes both to allow passage of screws for fixing the latch block 18 to the door 19

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and to allow passage of a finger member 21 rigidly connected to a movable handle 22 which transmits upward movement exerted by the user on the movable handle 22 to the free end of the striker 3. The movable handle 22 is pivoted to the door 19 in a known way and in such a way that it can turn about its pivot axis 23. The form of the end of the striker 3 and of the latch block 18 in the region of the finger member 21 (which in rest conditions do not touch) is such that in the event of knocks against the door 19 such ends touch one another so that the striker 3 contacts against the latch block 18 preventing any damage to the probe member 16 which could become sheared off, since, as already mentioned, having to pass through the hole 17 which for reasons of security must be small, it too is of reduced dimensions.

In order to understand the operation of the dishwasher door closure device we start from the condition that the door 19 is closed. If the user wishes to open the said door 19 he presses the movable handle 22 upwards; this movement, through the finger 21 is transmitted to the free end of the striker 3 and to the safety switch 12 (which is rigidly connected to it) which starts to rise turning about the pivots 4. The plunger 15 of the safety switch 12 therefore starts to be lowered and after a stroke of 1.5 mm the switch contacts open. Then if the machine is in operation the mains supply will be cut off and the machine would stop.

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The striker 3 continues to rise and after a stroke of 4 mm. the free end of the striker 3 is located in a region overlying the part of the latch block 18 which supports the probe 16 and from this moment there is
5 no longer any impediment tying the door 19 and the body 1 of the machine together, and the door 19 can open without further obstacle.

This extra stroke of 2.5 mm. between the moment when
10 the supply is disconnected and the moment in which the door 19 starts to open avoids any risk to the user. When the door 19 is open the striker 3, turning about the pivots 4, due to the spring 10 and under its own weight, is again lowered passing beyond the rest position until it touches the support 6 for the striker
15 and comes to rest 1 to 2 mm. lower than the rest position.

Upon closure of the door 19 the part of the latch block
20 18 which supports the probe 16 touches the lower free end of the striker 3 making it rise above the rest position in such a way that the probe 16 can pass without interfering with the striker 3; at this point the biasing spring 10 (which is preloaded under
25 compression) makes the striker 3 turn to its rest position holding the door 19 closed, whilst the probe 16 compresses the plunger 15 of the safety switch 12 enabling the supply to reach the electrical members of the machine.

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- The said spring 10 must overcome the friction and the closure force of the plunger 15 which is equivalent to about 500 grammes and given that it works in a plane parallel to the closure plane of the door 19 it is
- 5 sufficient that it can balance a load of about 1 kg. More or less the same load is sufficient for the user to open or close the door 19 and therefore the opening and closure operation of this door 19 will be "very soft".
- 10 Moreover, if because of friction the force should become greater than that envisaged, because of the production tolerances, it would be sufficient to increase the coefficient of elasticity of the spring 10 to resolve the problem.
- 15 It is to be noted that even upon closure of the door 19 the two phases, that is the mechanical and electrical phases, take place in succession: first the mechanical locking between the free end of the striker 3 and the
- 20 part which supports the probe 16 of the latch-block 18 takes place, and then the closure of the safety switch 12 due to the pressure of the probe 16 on the plunger 15 occurs.
- 25 From the above description the advantages of the dishwasher door closure device forming the subject of the present invention will be clear. In particular these are represented by the reduction (or in some cases elimination) of the number of electrical cables
- 30 which must pass from the door to the body of the dish-

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washer, the softness of the door opening and closing operation, and a greater safety for the user in the event that he should perform this operation carelessly.

- 5 It is also clear that numerous variations to the described device are possible and will be apparent for example to the man skilled in the art, without by this departing from the scope or principles of novelty inherent in the inventive idea.



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Claims:

1. A door closure device for a dishwasher comprising a body, a washing chamber in which there is
5 located at least one rotatable drum, electrically operated members in particular a heater element and a washing pump, means for directing the water within the machine and a door for closure of the washing chamber, characterised by the fact that the said device
10 includes mechanical means (3,18) disposed in part on the door (19) and in part on the body (1) of the dishwasher and electrical means (12) for enabling and disabling the said electrically operated members and disposed solely on the body (1) of the dishwasher
15 itself.

2. A dishwasher door closure device according to Claim 1, characterised by the fact that the said device acts, upon opening of the door (19) first to
20 disable the said electrical means (12) and subsequently to actuate the said mechanical means (3,18), whilst upon closure of the door (19) it first actuates the mechanical means (3,18) and subsequently enables the said electrical means (12).

25

3. A dishwasher door closure device according to Claim 1, characterised by the fact that it includes a resilient element (10) positioned in a plane parallel to the plane of opening and closing of the said mechanical means (3,18) which allows the user to effect
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opening and closing movements of the said door (19) of the dishwasher by the application of a modest force in such a way that this manoeuvre shall not be inconvenient to the user.

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4. A dishwasher doorclosure device according to Claim 1, characterised by the fact that the said electrical means (12) include a safety switch (12) positioned in series with the electrical supply from the mains.

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5. A dishwasher door closure device according to Claim 1, characterised by the fact that the said mechanical means (3,18) include a striker (3) and a latch block (18) which cooperate to actuate the latching and unlatching of the said door (19).

15

6. A dishwasher door closure device according to Claim 5, characterised by the fact that the said striker (3) has a support (7) for the switch, which also has two cylindrical projections (8,9).

20

7. A dishwasher doorclosure device according to claim 5, characterised by the fact that the said latch block (18) has a probe. (16).

25

8. A dishwasher door closure device according to Claims 4 and 6, characterised by the fact that the said safety switch (12) is mounted on the switch support (7).

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9. A dishwasher door closure device according to Claim 8, characterised by the fact that assembly is effected by fitting the said safety switch (12), by means of a reference hole (13) over the said projection (9) of the said support (7) and subsequently screwing a screw (14) between the said safety switch (12) and the said switch support (7).

10. A dishwasher door closure device according to Claims 4,7 and 8, characterised by the fact that the said safety switch (12) has a plunger (15) for opening and closing its electrical contacts, and by the fact that this plunger (15) after assembly, is located adjacent the said hole (17) of the said striker (3).

11. A dishwasher door closure device according to Claims 7 and 10, characterised by the fact that the dimensions of the said hole (17) are such that a test device of the dimensions determined by the institution setting the regulations with regard to user safety cannot succeed in actuating the said plunger (15) of the said safety switch (12).

12. A dishwasher door closure device according to claims 5 and 7, characterised by the fact that the said striker (3) has a hole (17) to allow the passage of the said probe (16).

5

13. A dishwasher door closure device according to claim 7, characterised by the fact that the said probe (16) has a form and dimensions such that during the opening and closing movements of the door (19) of the dishwasher it does not interfere at any stage with the said striker (3).

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14. A dishwasher door closure device according to claim 12, characterised by the fact that the said probe (16) has a form and dimension such that it can enter freely into the said hole (17) in the said striker (3).

15

15. A dishwasher door closure device according to claims 10 and 14, characterised by the fact that by entering the said hole (17) in the said striker (3) the said probe (16) controls the said plunger (15) which opens and closes the electrical contacts of the said safety switch (12).

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16. A dishwasher door closure device according to claims 5, 7 and 12, characterised by the fact that the shape of the ends of the said striker (3) and of the said latch block (18) is such that in the event of accidental knocks on the said door (19), when it is closed, these interfere with one another, coming into contact whereby to prevent the said probe (16) from becoming sheared by the said striker (3).

30

17. A dishwasher door closure device according to claim 5, characterised by the fact that the said striker (3) is connected to the said body (1) of the dishwasher

in such a way that it can turn about its point of connection.

18. A dishwasher door closure device according to
5 claim 17, characterised by the fact that the said connection
between the said striker (3) and the said body (1) is
obtained by means of two cylindrical pins (4) projecting
from the said striker (3) which are inserted in two
cavities (5) of a striker support (6) which is then fixed
10 to the said body (1) of the dishwasher.

19. A dishwasher door closure device according to
claim 3, characterised by the fact that the said resilient
element (10) is pre-loaded before assembly and works under
15 compression.

20. A dishwasher door closure device according to
claim 3, characterised by the fact that the said resilient
element is constituted by a spring (10).
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21. A dishwasher door closure device according to
claims 6 and 19, characterised by the fact that the said
spring (10) is positioned between the said cylindrical
projections (8) of the said switch support (7) and a
25 projection (11) of the said striker support (6) in
correspondence with the said cylindrical projections (8)
of the said switch support (7).

22. A dishwasher door closure device according to
30 claim 5, characterised by the fact that the said striker (3)
is actuated upon opening of the door (19) by a finger (21)
rigidly connected to a movable handle (22).

23. A dishwasher door closure device according to claims 2, 5 and 11, characterised by the fact that the opening or closing stroke of the said plunger (15) of the said safety switch (12) is less than the stroke which the said striker (3) must make in order to mechanically release the said latch block (18).



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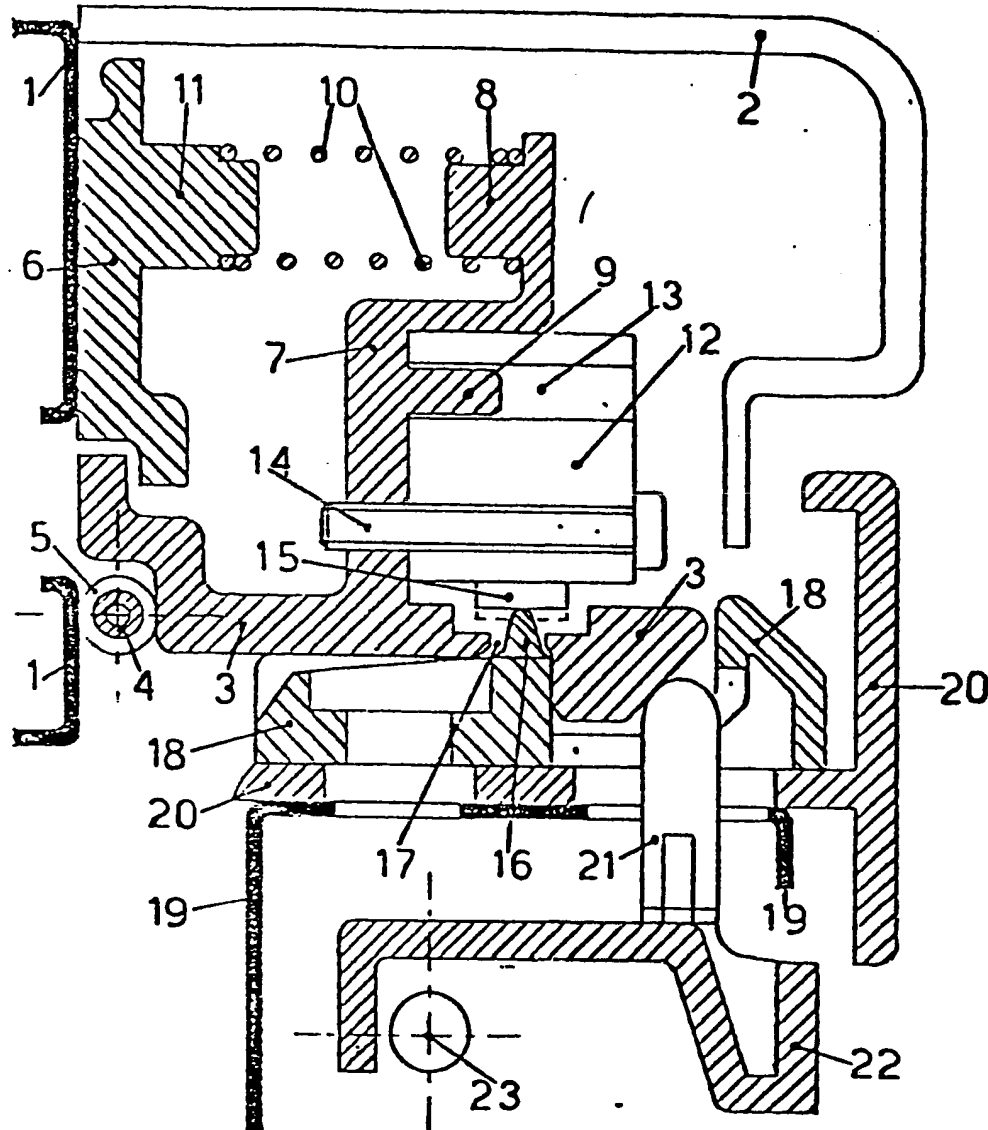


FIG 1

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DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl. 3)
Y	GB-A-2 031 053 (T.I. DOMESTIC APPLIANCES LTD.) * figure 2 *	1,2	A 47 L 15/42 D 06 F 37/42
Y	DE-A-2 949 565 (BARSKE) * figure 1 *	1,2	
A	DE-A-2 106 272 (LICENTIA) * figure 1 *	1	
A	DE-A-2 257 587 (ROCCHITELLI)		
A	US-A-3 638 457 (FILIPAK)		
			TECHNICAL FIELDS SEARCHED (Int. Cl. 3)
			A 47 L 15/00 D 06 F 37/00 D 06 F 39/14
The present search report has been drawn up for all claims			
Place of search BERLIN		Date of completion of the search 30-11-1982	Examiner KLITSCH G
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